

Methodological note: Proposed indicator framework for monitoring SDG targets on drinking-water, sanitation, hygiene and wastewater¹

The purpose of this note is to inform discussions by the Inter Agency and Expert Group on Sustainable Development Goal indicators (IAEG-SDGs). The group was formed by the 46th Statistical Commission to develop an indicator framework and a list of indicators for monitoring the proposed post-2015 SDG targets, and met for the first time 1-2 June 2015. This note, supersedes previous versions submitted earlier, outlines a proposed indicator framework for monitoring SDG 6 targets on drinking-water, sanitation and hygiene (WASH) as well as wastewater. This note demonstrates statistical robustness and readiness of the proposed indicators for post2015 monitoring under the SDGs framework.

Section A: Background and guiding principles

A.1 Proposed SDG targets

The Open Working Group (OWG) on Sustainable Development Goals (SDGs) report to the UN General Assembly² proposed a framework of 17 SDGs covering a range of drivers across the three pillars of sustainable development. The OWG proposal includes a dedicated goal on water and sanitation comprising six technical targets (Box). This note covers indicators for monitoring target 6.1 on drinking water, 6.2 on sanitation and hygiene, and the wastewater treatment element of 6.3.

SDG Goal 6: Ensure Availability and Sustainable Management of Water and Sanitation for All

- 6.1** By 2030, achieve universal and equitable access to safe and affordable **drinking water** for all
- 6.2** By 2030, achieve access to adequate and equitable **sanitation and hygiene** for all **and end open defecation**, paying special attention to the needs of women and girls and those in vulnerable situations
- 6.3** By 2030, improve **water quality** by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated **wastewater** and substantially increasing recycling and safe reuse globally
- 6.4** By 2030, substantially increase **water-use efficiency** across all sectors and ensure **sustainable withdrawals** and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity
- 6.5** By 2030, implement **integrated water resources management** at all levels, including through transboundary cooperation as appropriate
- 6.6** By 2020, protect and restore **water-related ecosystems**, including mountains, forests, wetlands, rivers, aquifers and lakes
- 6a** By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies
- 6b** Support and strengthen the participation of local communities in improving water and sanitation management

Targets 6.1 and 6.2 seek to address the unfinished business and shortcomings of Millennium Development Goal target 7c and call for universal access to drinking water, sanitation and hygiene. Targets 6. 2 and 6.3 expand the framework beyond the use of sanitation facilities to cover the full sanitation chain and underscore the importance of treating wastewater which is a dominant source of water pollution and deterioration of water quality. Targets 6.a and 6b focus on the means of implementation to achieve the water and sanitation targets through international cooperation and capacity building support and by

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² 68th General Assembly document: A/68/970, available at <http://undocs.org/A/68/970>

supporting and strengthening the participation of local communities in improving water and sanitation management.

A.2 Global reporting mechanisms

The WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation is the current and future monitoring mechanism for targets 6.1 and 6.2. Established in 1990, JMP is the global authority for WASH sector monitoring and has a long and strong track record in working closely with Inter Agency Expert Groups, UN Statistical Division and national statistical authorities to develop and apply common standards for data collection and analysis. Over the past four years the JMP has facilitated international consultations to develop proposals for monitoring the progressive elimination of inequalities in access to different levels of drinking-water, sanitation and hygiene services.

WHO and UNICEF are partnering and collaborating with other UN agencies under the Global Expanded Water Monitoring Initiative (GEMI, a new inter-agency initiative with additional partners: the United Nations Environment Programme (UNEP), the United Nations Human Settlements Programme (UN-Habitat), the United Nations Children’s Fund (UNICEF), the Food and Agriculture Organization of the United Nations (FAO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Health Organization (WHO) and the World Meteorological Organization (WMO))³ to develop indicators and methods for expanded monitoring of wastewater for target 6.3. It aims to complement JMP reporting on 6.1 and 6.2 by supporting global reporting of progress on SDG targets 6.3-6.6.

The WHO led UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) is a well-established bi-annual global monitoring initiative with a comprehensive range of enabling factor and process indicators covering areas of governance, monitoring, human resources and financing which are relevant to reporting on means of implementation targets 6a and 6b.

A.3 Criteria for indicator selection

The foremost purpose of global monitoring is to provide evidence for policy making and must therefore be action-oriented, measuring progress objectively for the global community and providing guidance on global investments. Indicators proposed in this document have been selected on the basis of the following criteria, and are summarized in the table below:

1. Prominence in the monitoring of major international declarations to which (all) member states have agreed, or has been identified through international mechanisms such as reference or interagency groups as a priority indicator in specific program areas.
2. Scientifically robust, useful, accessible, understandable and SMART (specific, measurable, achievable, relevant and time-bound).
 - Cost effective measurability by countries
 - Specific and time-bound
 - Achievable depends on affordability and capacity, which need further assessment for different categories of countries
 - Relevant as assessed by Member States.
3. Strong track record: preferably supported by an experience and international database.
4. Used by countries in the monitoring of national plans and programmes. Tried and tested by individual countries, regions or globally as part of intergovernmental processes

³ <http://www.unwater.org/gemi/en/>

5. Methodological soundness, and easy to understand and communicate, as identified in the report Lessons Learned from MDG Monitoring of the IAEG-MDGs⁴.
6. Possibility for aggregation/disaggregation.
7. Universal but adaptable to local conditions.

Criteria for indicator selection	Indicator area			
	Drinking water	Sanitation	Hygiene	Wastewater
Prominence, interagency monitoring	Yes	Yes	New	Yes
SMART	Yes	Yes	Yes	Yes
Strong track record	Yes	Yes	New	New ⁵
Methodologically sound	Yes	Yes	Yes	Yes
Easy to understand	Yes	Yes	Yes	Yes
Cost effective to monitor	Yes	Yes	Yes	Yes
Country capacity	Yes	Yes	Yes	Yes

A.4 Data sources

Global monitoring requires timely and reliable data gathered in a cost-effective manner. For example, the JMP primarily relies on household surveys and censuses conducted by National Statistical Offices. These serve multiple sectors, are known for their quality and reliability, and provide data at minimal additional cost. Household surveys and censuses will therefore remain the primary source of data for monitoring targets 6.1 and 6.2 as well as the domestic wastewater part of 6.3 in the post-2015 period. But in order to address the ambition of the SDG targets, other data sources will be progressively integrated including, inter alia, from administrative sources and regulators as well as other novel but highly cost-effective sources of data from earth observations.

The next section outlines the latest thinking on methods and indicators for estimating progress in relation to proposed SDG targets on drinking water, sanitation, hygiene and wastewater. While some of the indicators identified are already well established and can be monitored immediately post-2015, others are relatively new and will need to be developed over the short, medium, or long term. While global and regional estimates can be made based on the limited data already available, indicator availability at the country level is expected to increase throughout the SDG period.

A.5 Data disaggregation to monitor inequalities

The SDG targets can only be considered achieved when met for all sub-groups within the population and the OWG proposal calls for progressive disaggregation of data by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts. JMP will therefore continue to develop its reporting of **inequalities** and their progressive reduction. Some stratifiers can be reported immediately, while others will require further development during the SDG period. **Affordability** of water and sanitation services is an important cross-cutting concern. JMP plans to use available data on household expenditure, tariffs, income and poverty to start benchmarking affordability across countries and reporting national, regional and global trends.

⁴http://unstats.un.org/unsd/broaderprogress/pdf/Lesson%20Learned%20from%20MDG%20Monitoring_2013-03-22%20%28IAEG%29.pdf

⁵ With a strong track record of underlying components used to construct this indicator

Immediate/short term. Data which JMP has already collected from household surveys and censuses can be disaggregated immediately by **urban and rural** areas. Additional information can be extracted from household surveys and censuses with additional analysis. Access to different levels of water and sanitation service ladders disaggregated by wealth quintiles are now available from approximately 80 countries. The methodology being finalized can be applied to the great majority of the household surveys for which JMP has the raw data (microdata). An indicator of **wealth** inequality could be the gap (or ratio) between the highest and the lowest quintiles, and/or the rate of change in this gap or ratio. Another short-term stratifier could be **sub-national regional distribution**. Many of the household surveys in the JMP database generate statistically representative estimates among 4-10 subnational regions but this information has not yet been systematically extracted from survey reports or microdata into the JMP database. Subnational analysis could also be made of particularly vulnerable areas, such as districts with high levels of poverty or Neglected Tropical Diseases. Such disaggregation would further shed light on subnational disparities on access for targeting interventions to those most at risk in the post2015 period.

Medium/long term. Most household surveys and censuses in the JMP database do not include a separate strata for **informal urban settlements** or slums which may fall outside official enumeration areas used by household surveys and censuses. Monitoring of WASH in “slums” is challenging in that many definitions of “slums” include lack of access to water and sanitation services, creating a tautological problem. In the medium term, JMP can engage with researchers or agencies with special expertise (e.g. UN-Habitat) to explore new methods to characterize informal urban settlements and water and sanitation services, for example using Earth Observations, water point mapping, crowd-sourcing, or other innovative approaches.

Locally important disadvantaged groups, by definition, will not be the same in all settings. In many cases locally important stratifiers are already included in household surveys but it would be preferable for Member States to go through a participatory process to identify locally disadvantaged groups and design monitoring instruments accordingly which will take time. Monitoring of disadvantaged groups is difficult when they form a small proportion of the population, therefore are difficult to reach through conventional household surveys. In such cases, alternative survey instruments or mechanism like rapid assessment type surveys and JMP will collaborate with researchers on innovative approaches to monitoring sub-populations. Citizens network, or crowd sourced data could be explored as an alternate measure. It is likely that other sectors would have a similar interest in sub-populations, and could collaborate on innovative data collection measures.

In the household surveys and censuses which form the majority of JMP data, most survey responses are made at the level of the household, and it is therefore impossible to accurately measure intra-household inequalities such as **sex, age, or disability**. Specially designed surveys or survey modules can elicit information regarding intra-household disparities, such as DHS maternal health module, or SIMPOC child labour module. Adding carefully designed modules to existing surveys will increase uptake of such data collection by national. Small Area Estimation techniques, among others could be used to monitor access to WASH or lack thereof for disadvantaged groups, or some individual-level inequalities.

Service levels. The data collected by JMP yield information about different service levels for water supply and sanitation. The core proposed indicators for SDG monitoring of drinking water and sanitation are ‘safely managed drinking water services’ and ‘safely managed sanitation services’, respectively, as described more fully in Section B. JMP will also report lower service levels, such as basic water and sanitation services (similar to the ‘improved’ classification used for MDG tracking) and no services (e.g. open defecation or use of surface water as a drinking water source). Countries will need to reach universal coverage with a basic level of service before universal coverage of ‘safely managed services’ can be

attained, and progress towards universal basic coverage should be seen as an important and necessary step towards reaching the SDG targets.

Location. The core proposed indicators for SDG monitoring of drinking water, sanitation and hygiene, as described more fully in Section B, refer to services at the household level. JMP will also report access to basic water, sanitation and hygiene services outside the home, focusing on schools and health facilities.

Section B: Proposed indicators and monitoring framework

B.1 Proposed Indicators and monitoring framework for drinking water in the SDGs

This section identifies indicators which could be used for monitoring the proposed SDG targets in all countries. Drinking water and sanitation ‘ladders’ are used to illustrate progressive improvement in both service levels and in monitoring over time and across countries at different stages of development.

B.1.1 Rationale and interpretation:

Target 6.1 – By 2030, achieve universal and equitable access to safe and affordable drinking water for all

Target language	Normative definitions of target elements
6.1 – By 2030, achieve	
<i>universal</i>	Implies all exposures and settings including households, schools, health facilities, workplaces, etc
and <i>equitable</i>	Implies progressive reduction and elimination of inequalities between population sub-groups
<i>Access</i>	Implies sufficient water to meet domestic needs is reliably available close to home
to <i>safe</i>	Safe drinking water is free from pathogens and elevated levels of toxic chemicals at all times
and <i>affordable</i>	Payment for services does not present a barrier to access or prevent people meeting other basic human needs
<i>drinking water</i>	Water used for drinking, cooking, food preparation and personal hygiene
<i>for all</i>	Suitable for use by men, women, girls and boys of all ages including people living with disabilities

B.1.2 Definition, data sources, disaggregation⁶

Service ladder	Indicator	Definition	Data sources and measurability	Disaggregation	Timeline
Household services					
Safely managed water	Percentage of population using safely managed drinking water services	Population using a improved ¹ drinking water source which is located on premises, available when needed and free of faecal (and priority chemical) contamination	Household surveys can provide data on improved water on premises as well as availability when needed and free from contamination via direct water quality testing. Administrative sources including drinking-water regulators can provide data on compliance with standards for water quality and availability	Urban/rural Wealth Affordability Others TBC	Elements from household surveys can be reported immediately. Safety/regulation will initially be estimated globally and regionally, and progressively at country level.
Basic water	Percentage of population using basic drinking-water services	Percentage of population using a improved drinking water source ⁷ with a total collection time of no more than 30 minutes for a roundtrip including queuing	Household surveys	As above	Immediate
Unimproved water	Percentage of population using inadequate sources of drinking water	Percentage of population using unimproved drinking water ⁸ sources or improved drinking water sources with a total collection time of more than 30mins	Household surveys	As above	Immediate
Surface water	Percentage of population using water directly from surface water sources	Percentage of population using surface water sources ⁹	Household surveys	As above	Immediate
Extra-household services					
Basic water in schools	% of pupils enrolled in schools with basic water services	Percentage of pupils enrolled in primary and secondary schools with a functional improved drinking water source on or near premises and water points accessible to all users during school hours	Institution surveys, admin data, EMIS	Urban/rural Gender	Medium term (monitoring package needs to be standardised; improved facilities depend on the type of facility; monitoring systems require national and international support)
Basic water in Health Care Facilities	% of beneficiaries using health care facilities with basic water services	Percentage of beneficiaries using health facilities with a functional improved water source on premises and water points accessible to all users at all times	Institution surveys, admin data, HMIS	Urban/rural	

⁶ The top row is the proposed SDG indicator, the rest are part of the global reporting 'ladder' used by JMP.

⁷ MDG 'improved' indicator; include the following sources: piped water into dwelling, yard or plot; public taps or standpipes; boreholes or tubewells; protected dug wells; protected springs and rainwater. Packaged drinking water is considered improved if households use an improved water source for other domestic purposes

⁸ Unimproved drinking water sources [MDG 'unimproved' indicator] include the following types: unprotected dug well, unprotected spring, cart with small tank/drum, bottled water

⁹ Surface water includes rivers, dams, lakes, ponds, streams, canals, and irrigation channels

B.1.3 Detailed methodology: safely managed drinking-water services

The proposed indicator of “safely managed drinking-water services” comprises four sub-elements:

- a. improved drinking water source, which is
- b. located on **premises**;
- c. **available** when needed; and
- d. **compliant** with faecal (and priority chemical) standards

The first three of these can be measured through integrated household surveys, and data collection will be similar to that for the “improved drinking-water” indicator used for MDG monitoring. Data for these elements are immediately available for over 100 countries, though questions on availability are not explicitly asked in household surveys but implied when households identify what is their main source of drinking water.

Household surveys can also provide information on water quality testing as direct measurement of water quality is increasingly adopted as a module in surveys. From 2012-2014, nationally representative water quality data have been collected in five developing countries, and this number is expected to rise as the module is being standardized. This is complemented by water quality data collected both at the household level as well as at the point of collection through JMP commissioned Rapid Assessment of Drinking Water Quality (RADWQ) done in six countries in 2004-2006.

Regulatory authorities also collect information on the proportion of populations accessing different types of regulated water services, and the extent to which such services provide water that is available when needed, located on premises, and meeting quality standards. The majority of regulatory data pertains to piped water supplies, either through household connections or external standpipes. However, regulators may also monitor point sources such as boreholes, springs, and rooftop rainwater catchments. It is estimated that most of the 75 countries classified as “high-income” by the World Bank will have water service data available from regulatory or other administrative sources. In addition, approximately 30-40 low- and middle-income countries are known to have drinking-water regulatory authorities, and this number is rising. Data from regulators, therefore, are already available from at least 100 countries around the world for SDG monitoring. One limitation is that regulators typically collect data on service coverage rather than actual usage, especially in the developing countries. However such data sources could fill important gaps in the information demanded by the post2015 water monitoring.

For countries that do not have drinking-water regulators or similar data from water authorities showing compliance with microbial and priority chemical standards, or for populations that have access to only non-regulated drinking-water supplies, estimates of compliance will be made from nationally representative water quality surveys (where available) or from review of literature drawn from similar settings.

Global estimates of safe management of water services can therefore be done relatively easily, as shown in the methodology below.

1. JMP holds a database which is primarily made up of data from household surveys that collect information on the different types of drinking-water supplies used by households across a given country. Surveys provide a nationally representative list of which water sources households report using. National regulatory authorities also have data on the proportion of people using different types of water supplies which fall under their jurisdiction. This represents the proportion of that technology which is regulated within a country or setting. This ratio (*reg*) is constrained to range between zero and

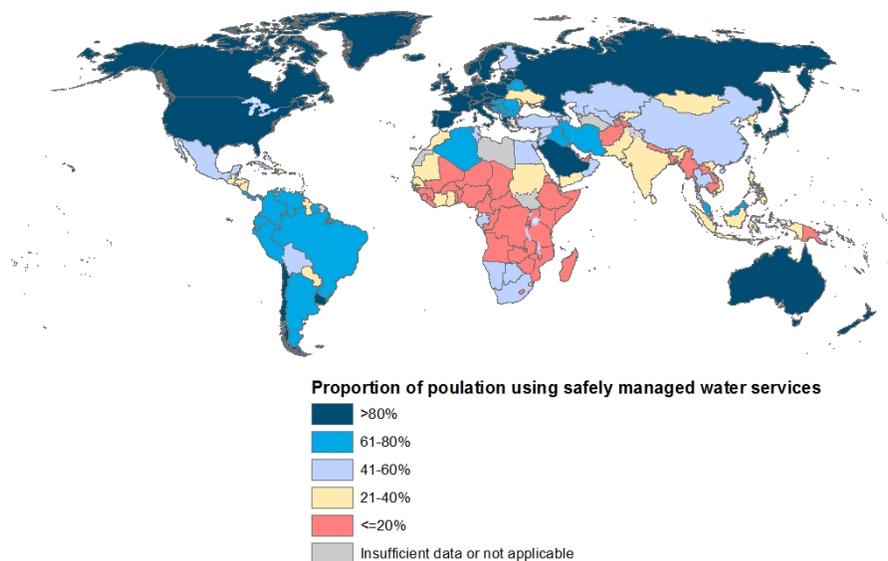
one, and the corresponding proportion of that technology which is unregulated (*unreg*) will be equal to $1-reg$.

- Regulators also have information about the proportion of **regulated** supplies which have sufficient water **available on premises** $RAP=[rap_1 rap_2 \dots rap_n]$, and which are **compliant** with regulatory quality standards $RC=[rc_1 rc_2 \dots rc_n]$.
- Many household surveys also provide information on whether sources used by households are on premises and time required to collect water. In such cases, estimates can be made of the population using **unregulated** water supply technologies **available on premises** generally piped water, boreholes, protected wells, and rainwater collection, or $UAP=[uap_1 uap_2 \dots uap_n]$.
- Similarly, data from household surveys or rapid assessments of drinking water can be used to generate **compliance** factors for **unregulated** supplies: $UC=[uc_1 uc_2 \dots uc_n]$.
- Factors for the proportion of technologies which are regulated or unregulated, available on premises, and compliant with standards can then be calculated and combined as illustrated below.

Integrated factors for supplies which are available on premises and compliant				
Drinking water sources	High income	Upper middle income	Lower middle income	Low income
Piped on premises				
Regulated ($reg*rap*rc$)	$.90*1*.98= .88$	$.60*.80*.95= .46$	$.50*.60*.90= .27$	$.60*.40*.80= .19$
Unregulated ($unreg*uap*uc$)	$.10*1*.95= .10$	$.40*.80*.90= .29$	$.50*.60*.85= .26$	$.40*.40*.70= .11$
TOTAL	.98	.74	.53	.30
Public tap				
Regulated ($reg*rap*rc$)	$1*0*.98= 0$	$1*0*.90= 0$	$.75*0*.80= 0$	$.50*0*.70= 0$
Unregulated ($unreg*uap*uc$)	$0*0*.95= 0$	$0*0*.85= 0$	$.25*0*.75= 0$	$.50*0*.60= 0$
TOTAL	0	0	0	0
Tubewell, borehole				
Regulated ($reg*rap*rc$)	$1*.50*.95= .48$	$1*.50*.80= .40$	$.50*.50*.70=.18$	$0*.50*.60= 0$
Unregulated ($unreg*uap*uc$)	$0*.50*.90= 0$	$0*.50*.75= 0$	$.50*.50*.65=.16$	$1*.50*.50= .25$
TOTAL	.48	.40	.34	.25
Protected well				
Regulated ($reg*rap*rc$)	$0*0*.80= 0$	$0*0*.70= 0$	$0*0*.60=0$	$0*0*.50= 0$
Unregulated ($unreg*uap*uc$)	$1*1*.75= .75$	$1*.80*.65= .52$	$1*.60*.50=.30$	$1*.40*.40= .16$
TOTAL	.75	.52	.30	.16
Protected spring				
Regulated ($reg*rap*rc$)	$0*0*.80= 0$	$0*0*.70= 0$	$0*0*.60=0$	$0*0*.50= 0$
Unregulated ($unreg*uap*uc$)	$1*0*.75= 0$	$1*0*.65= 0$	$1*0*.50=0$	$1*0*.40= 0$
TOTAL	0	0	0	0
Rainwater harvesting				
Regulated ($reg*rap*rc$)	$0*1*.80= 0$	$0*1*.70= 0$	$0*1*.60= 0$	$0*1*.50= 0$
Unregulated ($unreg*uap*uc$)	$1*1*.75= .75$	$1*1*.65= 0$	$1*1*.50= .50$	$1*1*.40= .40$
TOTAL	.75	.65	.50	.40

The factors from unregulated and regulated supplies can then be combined, and multiplied by the population estimates from surveys to calculate the proportion of populations accessing safely managed water services, from regulated or unregulated supplies. Preliminary estimates suggest that globally 48% of the population used a safely managed drinking water service in 2010, with 94%, 57%, 29% and 12% respective in High, Upper Middle, Lower Middle and Low income countries respectively.

Figure 1: proportion of population using safely managed drinking water services (illustrative)



B.2 Proposed indicators and monitoring framework for sanitation and hygiene in the SDGs

B.2.1 Rationale and interpretation:

Target 6.2 – By 2030, achieve adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations:

Target language	Normative definition of target elements
6.2 – By 2030, achieve	
access (for all)	Implies facilities close to home that can be easily reached and used when needed
to adequate	Implies a system which hygienically separates excreta from human contact as well as safe reuse/treatment of excreta in situ, or transport to a treatment plant
and equitable	Implies progressive reduction and elimination of inequalities between population sub-groups
sanitation	Sanitation is the provision of facilities and services for safe management and disposal of human urine and faeces
and hygiene	Hygiene is the conditions and practices that help maintain health and prevent spread of disease including hand washing, menstrual hygiene management and food hygiene
for all	Suitable for use by men, women, girls and boys of all ages including people living with disabilities
end open defecation	Excreta of adults or children are: deposited (directly or after being covered by a layer of earth) in the bush, a field, a beach, or other open area; discharged directly into a drainage channel, river, sea, or other water body; or are wrapped in temporary material and discarded
paying special attention to the needs of women and girls	Implies reducing the burden of water collection and enabling women and girls to manage sanitation and hygiene needs with dignity. Special attention should be given to the needs of women and girls in ‘high use’ settings such as schools and workplaces, and ‘high risk’ settings such as health care facilities and detention centres.
and those in vulnerable situations	Implies attention to specific WASH needs found in ‘special cases’ including refugee camps, detention centres, mass gatherings and pilgrimages

The JMP defines ‘safely managed sanitation services’ as population using a improved sanitation facility (‘improved’ sanitation facilities used for MDG monitoring i.e. flush or pour flush toilets to sewer systems, septic tanks or pit latrines, ventilated improved pit latrines, pit latrines with a slab, and composting toilets, the same categories as improved sources of drinking water used for MDG monitoring) which is not shared with other households and where excreta is safely disposed in situ or treated off-site.

Household surveys and censuses provide data on use of types of improved sanitation facilities listed above. The percentage of the population using safely managed sanitation services can be calculated by combining data on the proportion of the population using different types of improved sanitation facilities with estimates of the proportion of faecal waste which is safely disposed in situ or transported to a designated place for safe disposal or treatment. Similar ‘safety factors’ representing the proportion of wastes that are safely disposed of in situ or transported to a designated place are required to estimate the proportion of wastewater which is safely treated under target 6.3. The detailed method for estimating safe management of sanitation and domestic wastewater treatment is described in section B3.

One of the main critiques of the water and sanitation targets in the MDGs is that hygiene was not considered as clear links between hygiene and health are well established, as well as with economic and social benefits. Hygiene behaviours are very distinct from sanitation and management of faecal wastes, and require separate indicators. During JMP post2015 consultations, a dedicated Technical Working Group on hygiene reviewed potential indicators to be proposed for monitoring of hygiene in the post-2015 area.

The Working Group proposed separate indicators for handwashing with soap, menstrual hygiene management, and food hygiene, and recommended that these be monitored in the household, as well as in schools and health facilities. JMP interprets the reference to hygiene in the anticipated SDG target 6.2 as referring to all of these types of hygiene and settings: “Hygiene is the conditions and practices that help maintain health and prevent spread of disease including hand washing, menstrual hygiene management and food hygiene.” However, at present data on menstrual hygiene management and food hygiene are scarce compared to data on handwashing with soap. Handwashing with soap has been viewed as one of the most cost-effective way of reducing the global infectious disease burden, and is a focus of many public health campaigns in rich and poor countries alike.

Accordingly, JMP proposes handwashing with soap at home as a core indicator for tracking target 6.2. In its final report for the MDG period, there are already data from 54 countries from household surveys (p80, http://www.wssinfo.org/fileadmin/user_upload/resources/JMP-Update-report-2015_English.pdf). The number is increasing, as this is now a standard indicator in DHS¹⁰ and MICS¹¹ surveys.

JMP also proposes as supporting indicators handwashing in schools and health facilities, and menstrual hygiene management in schools and health facilities. Data on hygiene in schools and health care facilities will be collected through a combination of institutional surveys and sector management information systems. JMP recognizes that food hygiene is important, and will engage with evolving methods to measure food hygiene in the household.

Since 2009, MICS and DHS surveys have included a standard module on handwashing with soap with the enumerator verifying the presence of soap and water at the handwashing station. The presence of other local alternative materials (e.g. ash, mud or sand) is also recorded. The percentage of population with handwashing facilities with soap and water at home is then derived directly from household survey responses, and JMP has been reporting on these since the availability of such data.

¹⁰ Demographic and Health Surveys: <http://dhsprogram.com/>.

¹¹ Multiple Indicator Cluster Surveys: http://www.unicef.org/statistics/index_24302.html.

B.2.2 Data and method for monitoring sanitation services¹²

Sanitation service ladder	Indicator	Definition	Data sources and measurability	Disaggregation	Timeline
Household services					
Safely managed sanitation	Percentage of population using safely managed sanitation services	Population using a improved sanitation facility ² which is not shared with other households and where excreta is safely disposed in situ or treated off-site. This is a dual-purpose indicator covering the domestic part of wastewater treatment of 6.3	Household surveys can provide info on types of sanitation facilities and disposal in situ. Administrative, population and environmental data can be used to estimate safe disposal/treatment of excreta	Urban/rural Wealth Affordability Others TBC	Elements from household surveys can be reported in the short term. Excreta management will initially be estimated globally and regionally, and progressively at country level.
Basic sanitation	Percentage of population using a basic sanitation service	Percentage of population using a improved sanitation facility ¹³ not shared with other households	Household surveys	As above	Immediate
Shared sanitation	% of population using a shared sanitation service	Percentage of population using a improved sanitation facility shared with other households	Household surveys	As above	Immediate
Unimproved sanitation	% of population using an unimproved sanitation facility	Percentage of population using unimproved sanitation facilities ¹⁴ , with or without sharing with other households	Household surveys	As above	Immediate
Open defecation	% of population practicing open defecation	Percentage of the population practicing open defecation (defecating in bushes, fields, open water bodies or other open spaces)	Household surveys	As above	Immediate
Extra-household services					
Basic sanitation in schools	% of pupils enrolled in schools that provide basic sanitation services	Percentage of pupils enrolled in primary and secondary schools with functional improved separated sanitation facilities for males and females on or near premises ¹⁵	Institution surveys, admin data, EMIS	Urban/rural Gender	Medium term (monitoring package needs to be standardised; monitoring systems require national and international support)
Basic sanitation in health care facilities	% of beneficiaries using health care facilities providing basic sanitation services	Percentage of beneficiaries using health care facilities with functional improved separated sanitation facilities for males and females on or near premises ¹⁶	Institution surveys, admin data, HMIS	Urban/rural	

¹² The top row is the proposed SDG indicator, the rest are part of the global reporting 'ladder' used by JMP.

¹³ MDG 'improved' indicator, which include: flush or pour flush toilets to sewer systems, septic tanks or pit latrines, ventilated improved pit latrines, pit latrines with a slab, and composting toilets.

¹⁴ Unimproved sanitation facilities [MDG 'unimproved' indicator] include: flush/pour flush not going to sewer/septic/pit, pit latrines without a slab, hanging and bucket latrine

¹⁵ At least one toilet/latrine for every 25 girls, at least one toilet/latrine for female school staff, a minimum of one toilet/latrine and one urinal for every 50 boys and at least one toilet for male school staff

¹⁶ At least one toilet for every 20 users at inpatient centres, at least four toilets – one each for staff, female, male and child patients – at outpatient centres

B.2.3 Data and method for monitoring hygiene¹⁷

Hygiene	Indicator	Definition	Data sources and measurability	Disaggregation	Timeline
Household services					
Hand washing at home	Percentage of population with hand washing facilities with soap and water at home	Population with a hand washing facility with soap and water in the household	Household surveys	Urban/rural Wealth Affordability Others TBC	Immediate
Extra-household services					
Hand washing in schools	Percentage of pupils enrolled in schools with basic hand washing facilities	Percentage of pupils enrolled in primary and secondary schools with functional handwashing facilities, soap (or ash) and water available to girls and boys.	Institution surveys, admin data, EMIS	Urban/rural Gender	Medium term (monitoring questions need to be agreed; monitoring systems require national and international support)
Menstrual hygiene management in schools	Percentage of pupils enrolled in schools with basic menstrual management facilities	Percentage of pupils enrolled in primary and secondary schools with adequate and appropriate sanitary facilities for washing and change management and disposal of menstrual waste. These facilities must offer privacy, safety and dignity to menstruating students and teachers.	Institution surveys, admin data, EMIS	Urban/rural Gender	
Hand washing in health care facilities	Percentage of beneficiaries using health care facilities with basic hand washing facilities	Percentage of beneficiaries using health care facilities with adequate hand hygiene supplies (running water, liquid soap, single use towels/alcohol-based hand rinse) available at key locations.	Institution surveys, admin data, HMIS	Urban/rural	Medium term (monitoring questions need to be agreed; monitoring systems require national and international support)
Basic menstrual hygiene management in health care facilities	Percentage of beneficiaries using health care facilities with basic menstrual management facilities	Percentage of beneficiaries using health facilities with improved separated sanitation facilities for females that provide privacy; soap, water and space for washing hands, private parts and clothes; and places for changing and disposing of materials used for managing menstruation.	Institution surveys, admin data, HMIS	Urban/rural	

¹⁷ The top row is the proposed SDG indicator, the rest are part of the global reporting 'ladder' used by JMP.

B.3 Proposed Indicators and monitoring framework for wastewater in the SDGs

B.3.1 Rationale and interpretation:

Target 6.3 – By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and at least doubling recycling and safe reuse globally

Target language	Normative definitions of target elements
improve water quality by	Implies adequate quality of receiving water bodies so that they do not present risk to the environment or human health.
<i>Reducing pollution</i>	Pollution reduction implies both minimizing production of pollutants at source and reducing the discharge of polluting substances. Both point and non-point of pollution need to be considered. Point sources are frequently associated with discharges of domestic/municipal wastewater and a large proportion of non-point sources come from run off from both rural and urban areas. These sources constitute both agricultural runoff in rural areas and contaminated surface water from urban areas.
Eliminating dumping	Dumping of wastes refers to the inadequate disposal of both liquid and solid wastes. It relates to the disposal of solid wastes and associated liquid components that are leached into water resources. A good example would be the leachates produced by poorly managed solid waste disposal sites. These constitute a risk from both the possibility of hazardous substances present and their oxygen-depleting capacity.
<i>And minimizing release of hazardous chemicals and materials</i>	This relates to the discharges of certain hazardous substances, which are currently defined in the conventions of Basel, Rotterdam and Stockholm. Management is related to waste minimization strategies, however there is a component that relates to the impact of treatment on such components, and illegal dumping.
Halving the proportion of	Refers to: <ul style="list-style-type: none"> a) Halving the proportion of wastewater generated by households which is untreated b) Halving the proportion of wastewater generated by all hazardous economic activities (based on ISIC categories) which is untreated
Untreated wastewater	Refers to: <ul style="list-style-type: none"> a) Wastewater generated by households which does not undergo treatment as defined by SEEA treatment ladders: primary, secondary, tertiary to advanced treatment. b) Wastewater generated by hazardous economic activities which does not undergo treatment, where treatment is defined by SEEA treatment ladders (i.e. primary, secondary and tertiary treatment). In particular, hazardous (as defined by ISIC) industrial wastewater discharges can be verified against discharge permits.
<i>And increasing recycling</i>	Implies recycling of water within the same industry or establishment (on site).
<i>And safe reuse</i>	Implies wastewater supplied to a user for further use with or without prior treatment, and excludes that water which is recycled within industrial sites. The term 'Safe reuse' may be defined using a combination of treatment level (as defined by SEEA) and use type as a proxy for 2006 WHO Guidelines for safe use of wastewater.

B.3.2 Data and method for monitoring wastewater management

Wastewater ladder ¹⁸	Proposed indicator	Definition	Data sources and measurability	Disaggregation	Timeline
Safe treatment of wastewater	Percentage of wastewater safely treated ¹⁹	Proportion of wastewater generated by households and by economic activities which is safely treated ²⁰ compared to total wastewater generated by households and economic activities.	<p>The aim is to cover households and the entire economy, and to build on the monitoring framework of JMP, AQUASAT, IBNET, UNSD/UNEP Water Questionnaire for non OECD/Eurostat countries, OECD/Eurostat Questionnaire for OECD countries, etc., as well as pop density, depth to groundwater, land-use/land-cover data from earth observations. Statistical methods for measurement of wastewater treatment will align with the SEEA²¹ statistical standard and associated definitions, classifications and treatment categories</p> <p>The calculation of the indicator value as derived from the framework is the amount treated (off-site and on-site) divided by the total amount of waste produced. Data on treatment of domestic wastewater will come from the multi-purpose indicator 6.2.1. Data on volumes of industrial wastewater can be estimated from inventories of industries, which will be available in the majority of Member States disaggregated by ISIC classifications. The breakdown of treated wastewater can be calculated based on compliance records, related to national standards. Unless verified otherwise, through audited compliance records, the waste generated will be considered untreated.</p>	Domestic (on and off-site) and industrial wastewater	Global baseline estimates in 2016. Wastewater treatment will initially be estimated globally and regionally, and progressively at country level.

¹⁸ A ladder will define progressive improvement of “safely treated wastewater” from no treatment to the highest level of service.

¹⁹ Encompasses all wastewater generated and treated by the economy. Treatment Categories will be consistent, as much as possible within the context of global monitoring purposes, with those defined in the SEEA (<http://unstats.un.org/unsd/envaccounting/water.asp>), and International Recommendations for Water Statistics (IRWS: <http://unstats.un.org/unsd/envaccounting/irws/irwswebversion.pdf>)

²⁰ Based on treatment ladders as defined by the SEEA.

²¹ System of Environmental and Economic Accounting for Water, adopted by Statistical Commission in 2014. This accounting structure means that these activities cover the whole economy and are considered for each industry, which are defined according to the International Standard Industrial Classification of all Economic Activities (ISIC), and covering 1) abstraction and distribution of water, 2) discharge, reuse and treatment of wastewater, and 3) consumption and returns of water back to the environment, in this accounting structure, disaggregated by industry in a standardised way. Economic activities by ISIC broadly covers agriculture, hazardous industries and other economic activities.

B.4 Detailed method for monitoring safe management of sanitation/household wastewater treatment

The following gives a demonstration of how various data sources could be integrated for monitoring household wastewater (sewage and faecal sludge) treatment or the household part of wastewater treatment (6.3.1). This methodology equally applies to the indicator for safe management of sanitation services (6.2.1) and can be used in the absence of better country level data from service providers or regulators.

1. JMP maintains a global database primarily from household surveys, where data are collected on the use of various sanitation facilities that are used by people around the world.
2. Based on the types of toilets people use, and the country they are used in, safety factors could be attributed to a specific country and therefore a country could be shown as having x% of the faecal matter released to the environment. This could be combined with the population density, and use of sanitation facility type in a given location, to show the severity of the situation. The following illustration explains the method to calculate % of household wastewater (sewage and faecal sludge) safely managed and treated based on sanitation facility types used.

Sanitation facility used	Integrated safety factors, by country (income level)			
	High income	Upper middle income	Lower middle income	Low income
Flush/pour flush to piped sewer	100	60	40	20
Flush/pour flush to pit	95	90	85	80
Flush/pour flush to unknown	95	60	40	20
Flush/pour flush to other	95	60	40	20
Flush/pour flush to septic tank	100	80	75	70
Ventilated improved pit (VIP)	100	90	85	80
Improved pit	100	90	85	80
Traditional latrine	95	60	40	20
Composting toilet	100	90	80	70
Hanging latrine	0	0	0	0
Bucket latrine	0	0	0	0
Open defecation	0	0	0	0

3. The overall safety comes from a linear combination of steps including direct discharge to the environment, leakage during emptying and transportation, or inadequate treatment leading to unsafe disposal or reuse. An example of the overall safety factor is shown above for each type of sanitation facility used by individual households. Safety factors for the sewage treatment step will align with the SEEA statistical methods and definitions.

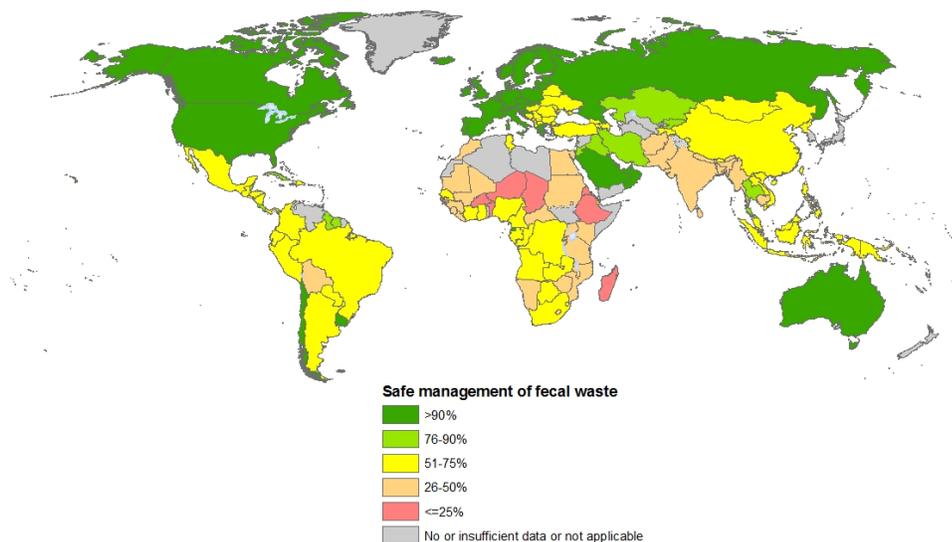
$$f = \sum_{i=1}^n a_i f_i, \text{ where } f_i = \prod_j f_{ij}$$

Here a_i is the proportion of the population using facility type i , and f_{ij} is the safety factors for facility i due to different steps j such as transportation and treatment. The factors f_i shown in the table above are for the demonstration purposes of this note, but the actual factors will come from actual country situations, be it from literature

reviews, focused studies or in-country consultation. GEMI is embarking on a pilot exercise in selected countries around the world to verify the approach.

4. The above estimation method could be used to establish baseline estimates of the status of safe domestic wastewater (sewage and faecal sludge) management and treatment in a given country or region of the world. Data from earth observations could be used to provide a deeper analysis.
5. GIS data from USAID supported Demographic and Health Surveys can give us cluster level data of use of actual types of toilets shown above. Multiple GIS layers of information: types of toilets, and associated safety factor, could be overlaid with population density data from LANDSCAN database, along with land-cover and land-use data could give us even richer information than shown in the table above and give local or other policymakers a better understanding of the situation on the ground for targeted interventions, or actionable policy formulation, or targeted funds allocation for upgrading of sanitation facilities and domestic wastewater (sewage and faecal sludge) management and treatment. This approach will also turn this indicator more population centric, from safe treatment of wastewater to population exposure or not to untreated wastewater, therefore making it relevant for public health decision makers as well (see figure iii in the Annex for Ethiopia; such analyses could be readily produced for 100 countries).
6. The demonstration exercise shows that globally only 38% of the domestic wastewater (sewage and faecal sludge) is safely managed and treated. These figures are 99%, 70%, 44% and 36% for High, Upper Middle, Lower Middle, and Low income economies respectively. Further integration of earth observations data on population density, land-cover/land-use are shown in the Annex showing where unsafe treatment puts population at greater risk or pollutes the environment.

Figure 2: Proportion of domestic wastewater safely managed and treated (illustrative for indicators 6.2.1 and 6.3.1)



B.5 Detailed method for monitoring industrial wastewater treatment²²

The total volume of wastewater generated by economic activities (the denominator) can be reliably estimated from an inventory of industries, which will be available in the majority of Member States disaggregated by ISIC classifications. This can be populated from databases and records held by Ministries of Industry, Tax offices, local authority registries etc. For each industry, records will be available on total water use, either from municipal supplies or other sources, or abstracted²³ directly from the environment. Given the knowledge of the type of industry (from International Standard Industrial Classification from all economic activities, revision 4, ISIC Rev4²⁴) and a mass balance of products in and out, the proportion of wastewater flow generated as waste water can be estimated.

The proportion of those industries which deal with hazardous substances, (defined according to pollutants documented in the various conventions (Stockholm, Basel and Rotterdam) and classified by ISIC codes can then be computed. The breakdown of treated wastewater can be calculated based on compliance records, related to national standards. Unless verified otherwise, through audited compliance records, the waste generated will be considered untreated.

The method described above might not cover small-scale or informal industries. As most of these activities occur in urban centres, or in their peripheries, available GIS tools, including high resolution remotely sensed images could be used to estimate such components.

Methodologies are being developed for point sources of pollution emanating from farms and agricultural establishments, where data from earth observations could be of use. Attention also needs to be given to landfills and disposal sites that produce significant quantities of leachate. It must also be borne in mind that some industrial processes have so-called “godfather installations”, i.e. although having ceased production, they still are responsible for continued emission of pollutants.

Baseline indicators are therefore reliably measured using existing data, and various sources of information. In addition to such indicator for global monitoring, member states can be encouraged to progress “up the monitoring ladder” by increasingly refining monitoring systems and protocols as they see fit.

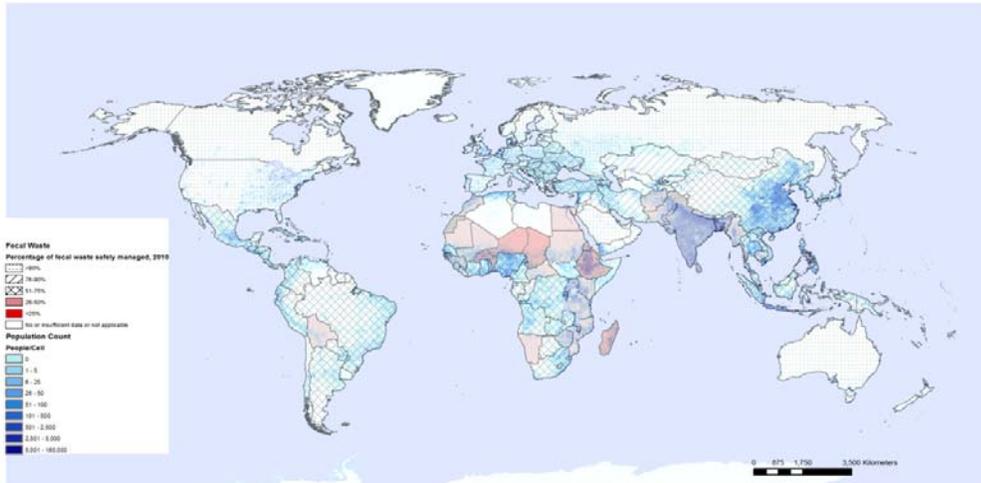
In terms of definitions, industrial wastewater is either directly discharged or in the case of a large proportion of non-hazardous industrial waste, is combined with domestic wastewater in a municipal sewer. Municipal wastewater would therefore be defined as a combined mix of domestic (black and grey water) together with waste water from commercial and non-hazardous industries. So called “trade wastes” are frequently non-hazardous wastes, with approved discharge permits. In addition to the records cited above, the possibilities for data from utilities can also be used to further refine estimates.

²² This section is developed by Graham Alabaster (Alabaster.unhabitat@unog.ch), UNHABITAT.

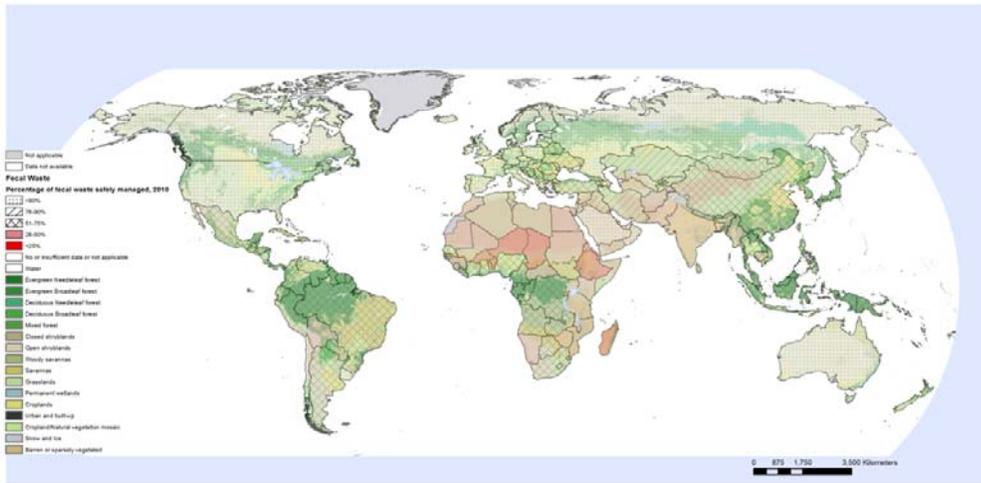
²³ In the SEEA, “abstraction” only refers to water supplied by the environment. Other sources of water used by an industry are referred to as “water received from another economic unit”. Therefore: Total Water Use = Water Abstracted for Own Use (Data item E.a) + Water received from other economic units (e.g. water supply industry).

²⁴ <http://unstats.un.org/unsd/cr/registry/isic-4.asp>

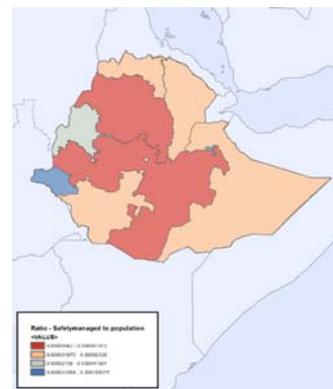
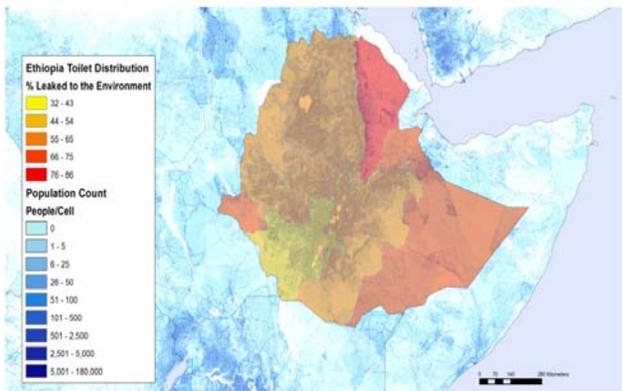
Annex



i) Density of population versus treatment of domestic wastewater



ii) Land-cover versus treatment of domestic wastewater



iii) Population density overlaid on leakiness from various sanitation services, Ethiopia sub-national; second figure showing proportion of safely treated wastewater per person in Ethiopia (darker colours denote less safe)